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Cleavage was traced to thirty-two cells, which remain broadly united to one another at the centre of the whole mass. The extraordinary conclusion is reached that some of the deeply staining ("chromatic") bodies of the outer zone of the egg form, during its first cleavage, nuclei, which have, however, no further rôle.

Gastrulation and mesoderm-formation, long misunderstood, are cleared up. In the 32-cell stage, four cells enter the blastula cavity at the upper pole; they represent the entoderm. This degenerates, and a pseudo-blastula results. An ingression of cells at the upper pole of the now much larger embryo follows: this is the mesoderm-formation. Thus the primitive entoderm is wholly rudimentary.

The pair of *primitive polypides* also arise at the upper pole and the larva is soon thereafter born. The position of the primary polypides seems reversed in Gymnolæmata and Endoprocta as compared with Phylactolæmata, for in the former groups this polypide arises at the pole at which gastrulation occurs.

In regard to the *law of sequence of buds*, Braem insists on the wide difference between the budding of Phylactolæmata and Gymnolæmata, since new polypides arise on the oral side of the old ones in the former, and on the anal side in the latter group. He forgets, however, that in both groups the anal side of the young bud is turned towards the source of its tissue.

The work before us is destined to become a classic. The typography is of the best. Eight quarto plates, by Werner and Winter, contain drawings which, while trustworthy, are almost diagrammatically clear.

C. B. D.

Lepidosiren. — From *Natural Science* we learn some facts regarding the development of the dipnoan, *Lepidosiren*, of Paraguay. Mr. J. Graham Kerr, of Cambridge, aided by a grant from the Balfour fund, went to Paraguay to obtain material for a history of this animal, and apparently was very successful in his search. *Lepidosiren* occurs in considerable numbers in the swamps, is rather sluggish, and comes to the surface at short intervals for respiration. Its food consists of the large snail, *Ampullaria*, and of confervoid algæ, the young being more vegetarian in their diet than are the adults. The animal makes a burrow in the ground at the bottom of the swamp, lines it with soft grass, and in it deposits her eggs. These eggs are very large, about 7 mm. in diameter, and, in the developing eggs, have a thin and horny coat, derived from a gelatinous coat which surrounds the eggs before oviposition. The segmentation is holoblastic and

unequal, and the process of gastrulation recalls that of the urodeles and cyclostomes. From the egg there hatches a tadpole which develops external gills and a very large sucker of the amphibian type. Both suckers and external gills disappear in about six weeks after hatching, but not until ten or twelve weeks does the larva feed for itself, living up to that time upon the yolk. During the breeding season the papillæ on the hind limbs of the male grow out into long blood-red filaments, apparently ornamental in nature. In the night the normally dark color of these animals changes to nearly white, the black chromatophores being retracted in darkness. In the dry season *Lepidosiren* behaves much like *Protopterus*, retreating into the mud and breathing by means of an air hole.

From this brief outline it would appear that *Lepidosiren* presents considerable similarity in its development to *Ceratodus*, as made known to us by the investigations of Semon.¹ The eggs in this form measure 6.5–7 mm. in diameter; segmentation and gastrulation are much the same, but in *Ceratodus* the envelope is gelatinous, while neither suckers nor external gills are developed. The similarities of both of these dipnoans to the Amphibia in their external development is very striking, but this does not of necessity imply any close relationship between the two groups. One recalls in this connection the larval forms of *Lepidosteus*, as described by Agassiz, and of *Amia*, as figured by Allis and by Dean.

Fishes of the Vicinity of New York City.—Mr. Eugene Smith has just published an excellent list of “the fishes of the fresh and brackish waters in the vicinity of New York City” in the *Proceedings of the Linnean Society of New York*.

The list comprises 61 species, 24 being native fresh-water species, 11 introduced species, and 26 belonging to brackish waters or running up the rivers to spawn. The list is accompanied by brief but accurate descriptions and by useful notes on the local distribution. The work is neatly and correctly done, and should be followed by an equally exact list of the marine fishes of the same region. Curiously enough, our knowledge of the local fish fauna of New York Bay is still incomplete.

D. S. J.

¹*Jena. Denkschriften*, Bd. iv, 1893.